**Cairo University Faculty of Engineering**

**Advanced Topics in Electronics-1**

**Under supervision of:**

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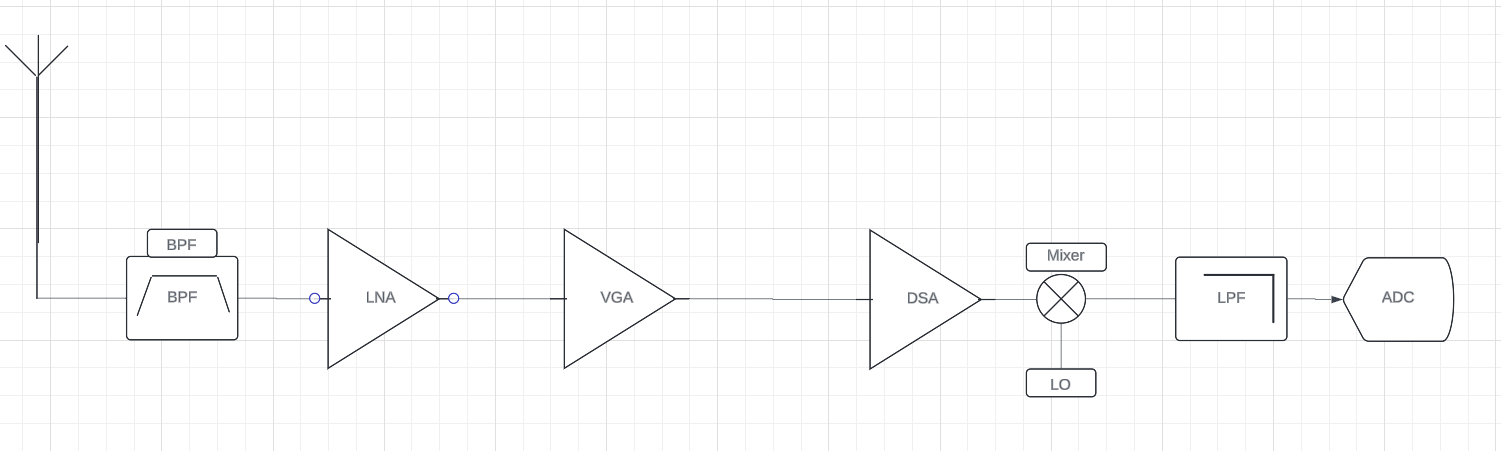
**Students Names:**

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* **Show the block diagram of your proposed receiver**

All the indicated values are referenced from ADI website , TI website , lecture and Papers.

the block proposed consists of BPF , LNA , VGA ,DSA, mixer, LPF

I also used amp/attenuator topologies as the NF needed to achieve the needed SNR at sensitivity was very low and the needed was achieved without attenuator/amp topologies.

it has multiple disadvantages like leakage and dc offset.

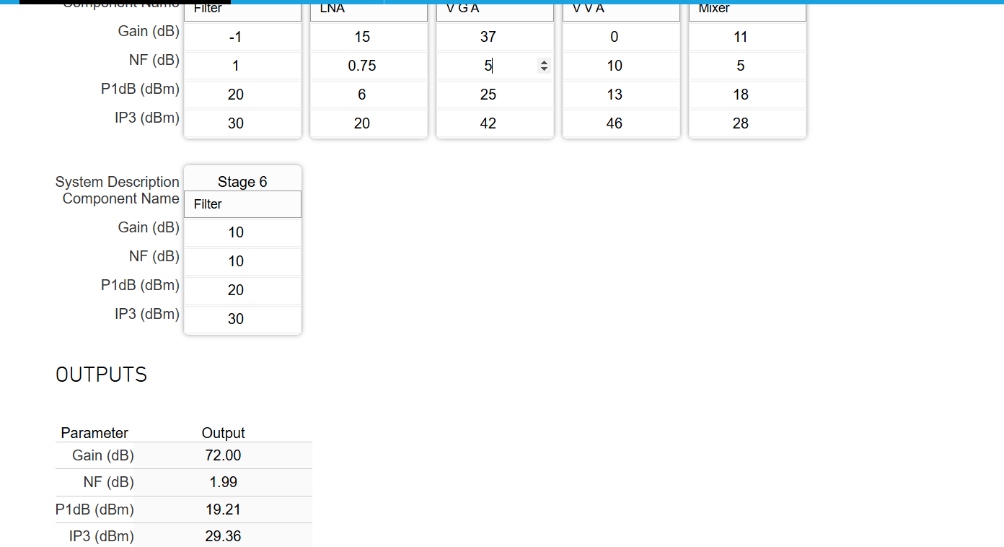
The (passive) is used at the beginning to filter out of band blockers, and it was used in front of the LNA so the out of band blockers won’t reach the and cause desensitization to the signal and cause the gain to drop to zero, but it has a disadvantage that it causes the to drop because of the loss that is add up across the chain.

A is used to achieve a gain up to to have at programmable from to with a step .

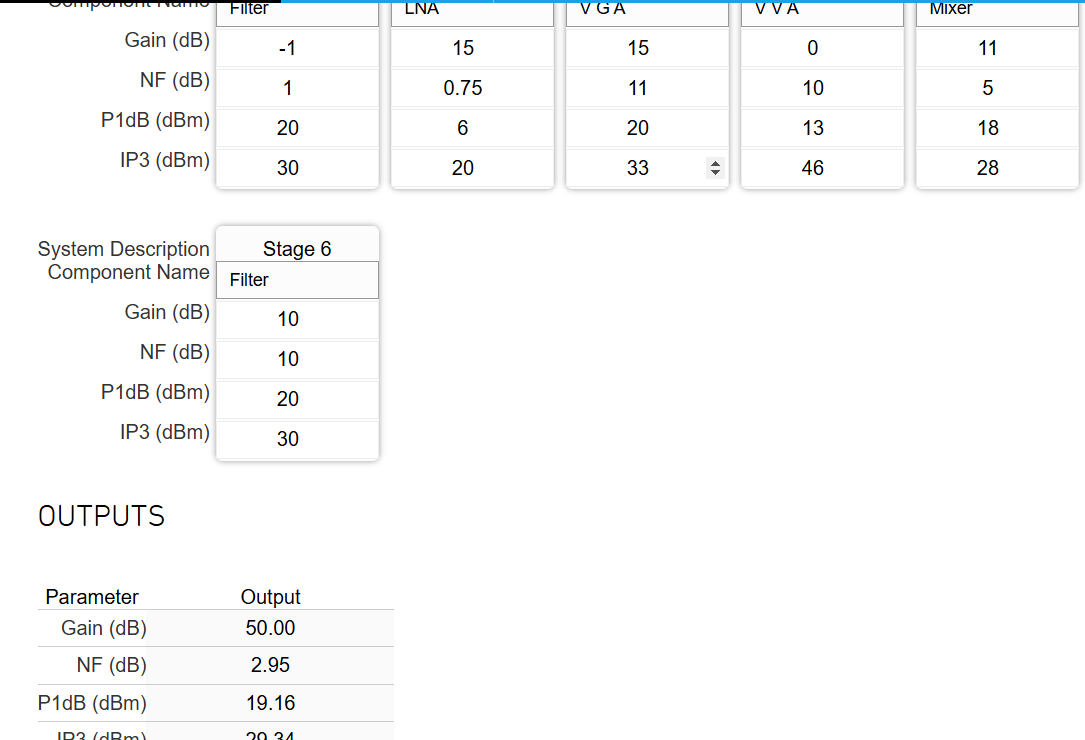
A is used to attenuate the Gain in case of gain needed for 🡺 programmable with a gain step of with a range with (active filter) to filter the in-channel blockers.

* **Indicate all gain/noise/linearity specs for the receiver blocks**

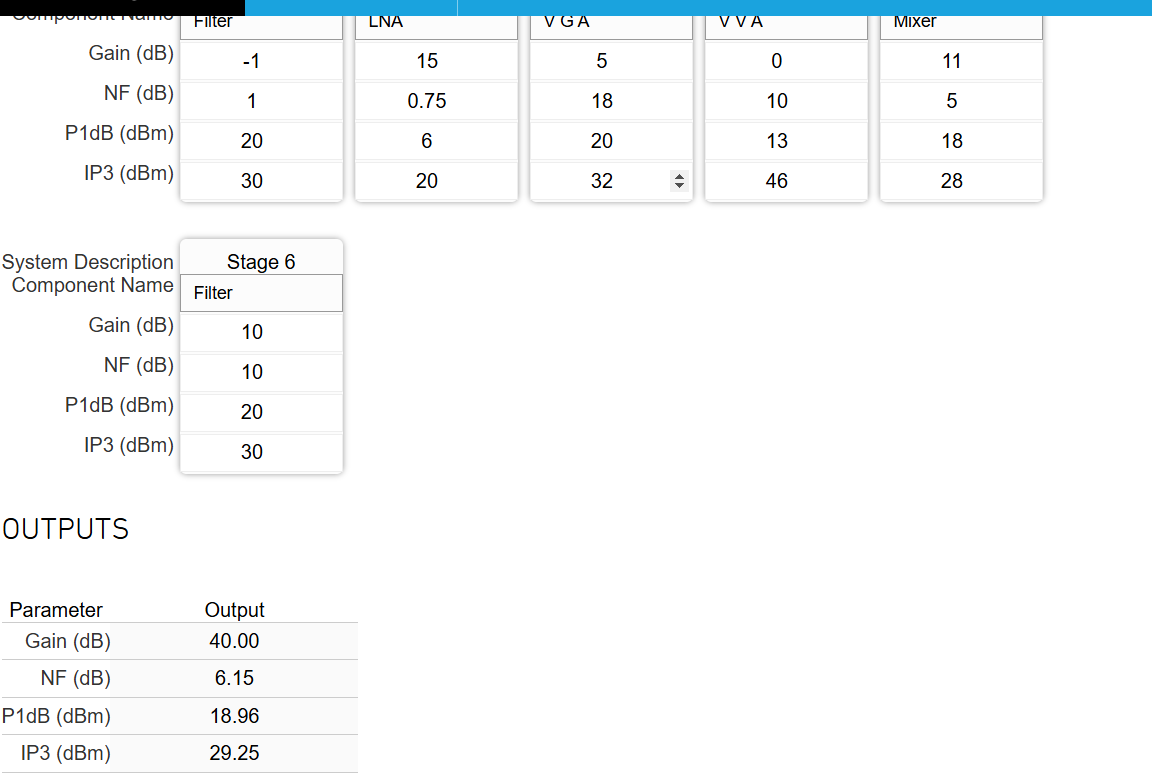
The gain/noise/linearity specs for spec for sensitivity, notice that which is required for a of . (We used as we did not find a on Qorvo)



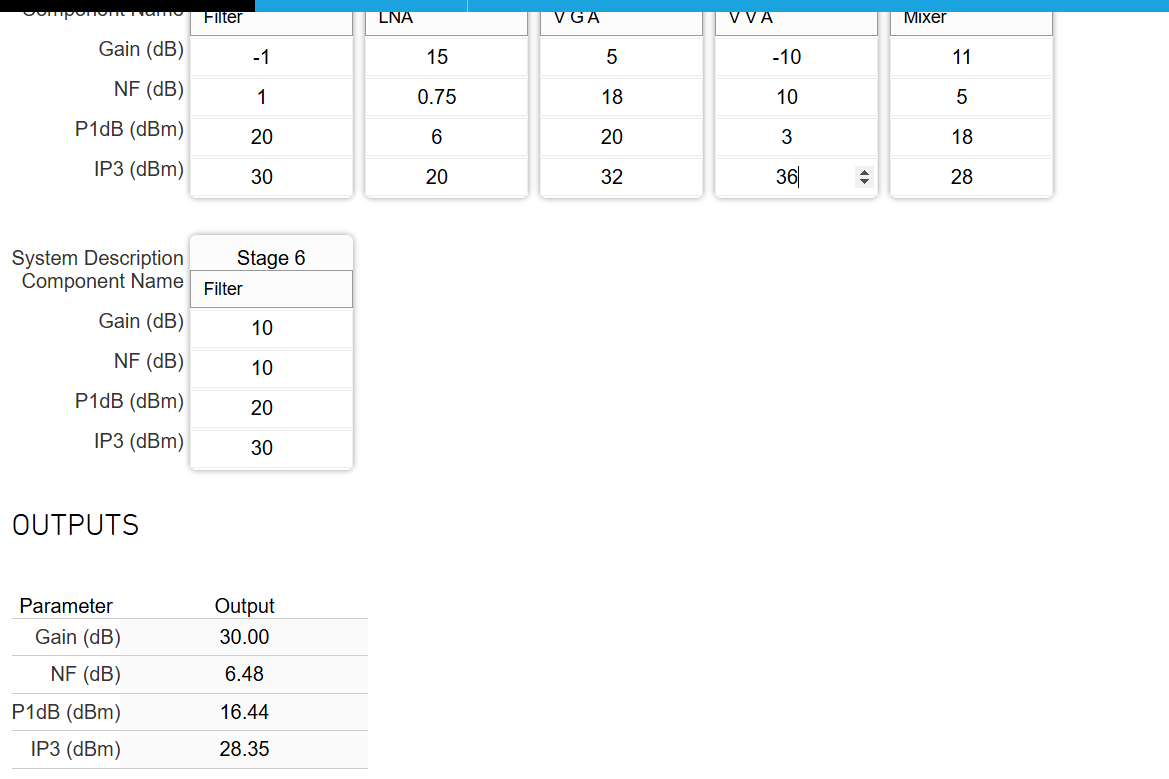
The gain/noise/linearity specs for



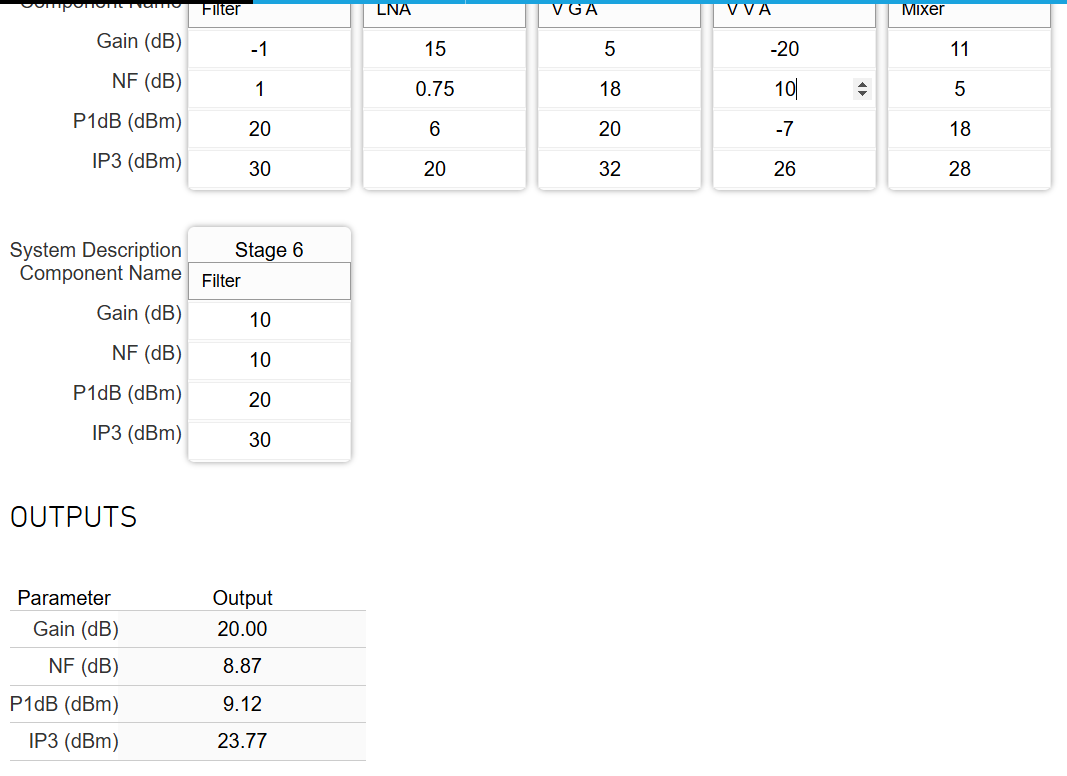
The gain/noise/linearity specs for



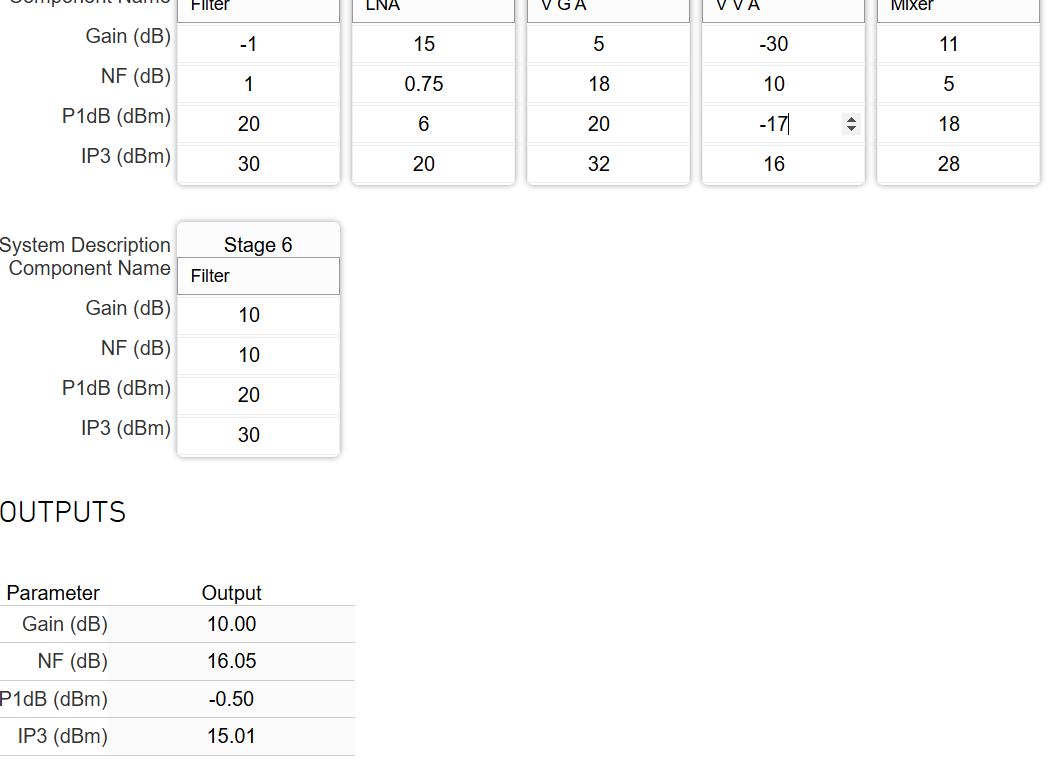
The gain/noise/linearity specs for



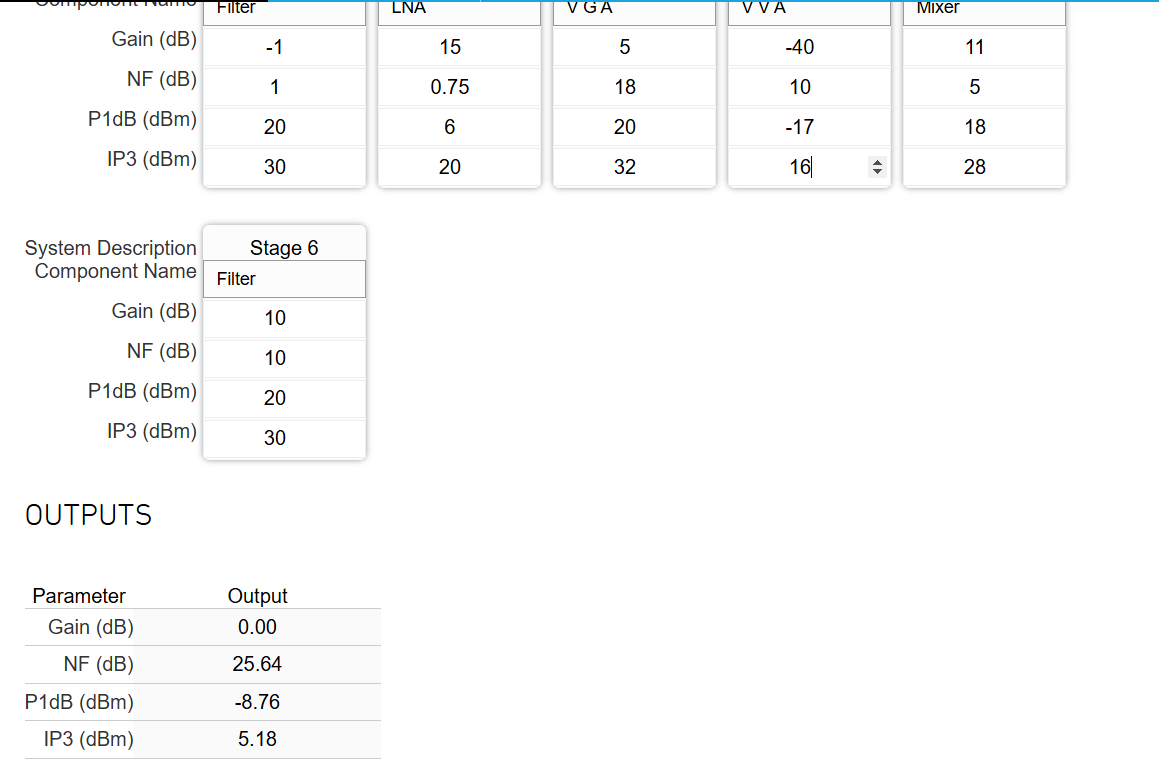
The gain/noise/linearity specs for



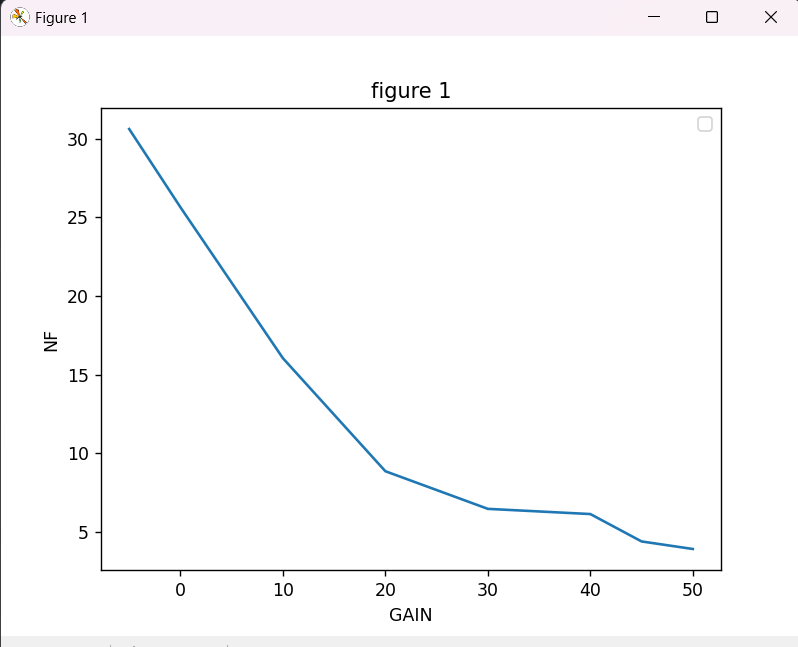
The gain/noise/linearity specs for



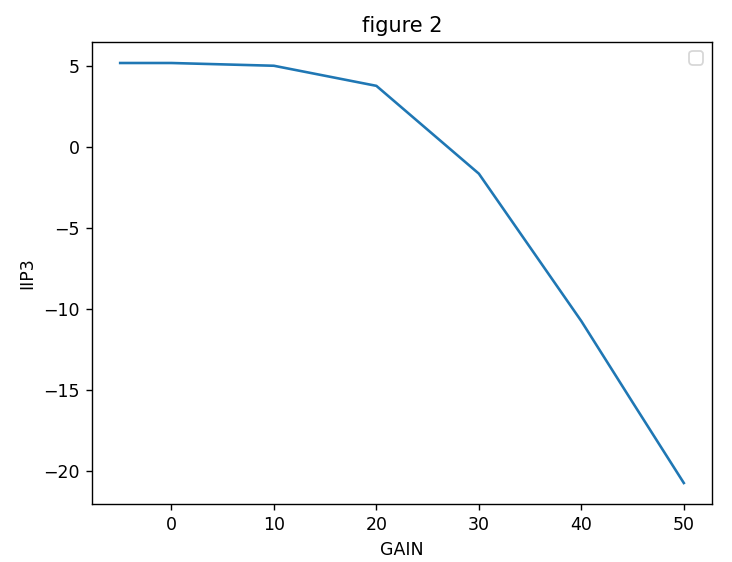
The gain/noise/linearity specs for



* **Provide and plots versus gain**

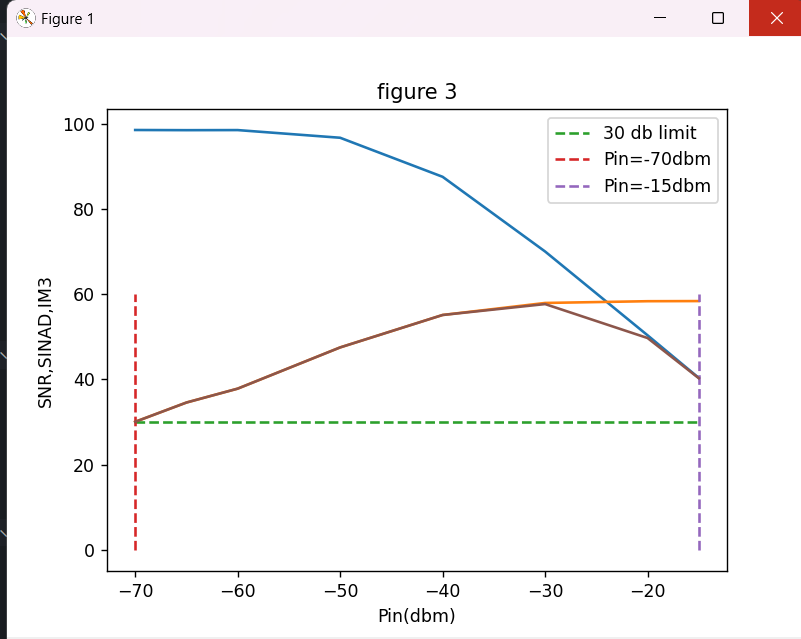


The noise figure began to saturate as the gain become higher because noise figure law (Frizz’s law) as gain increase noise figure decrease and it reaches a certain point and begin to saturate.



From the previous equation, will get affected by the gain of the following blocks, and the non-linearity in the following blocks increases as the gain increases.

* **Show the , , & curves for the receiver versus**



The specs for the is achieved at

🡺 which is shown the values.

Values:

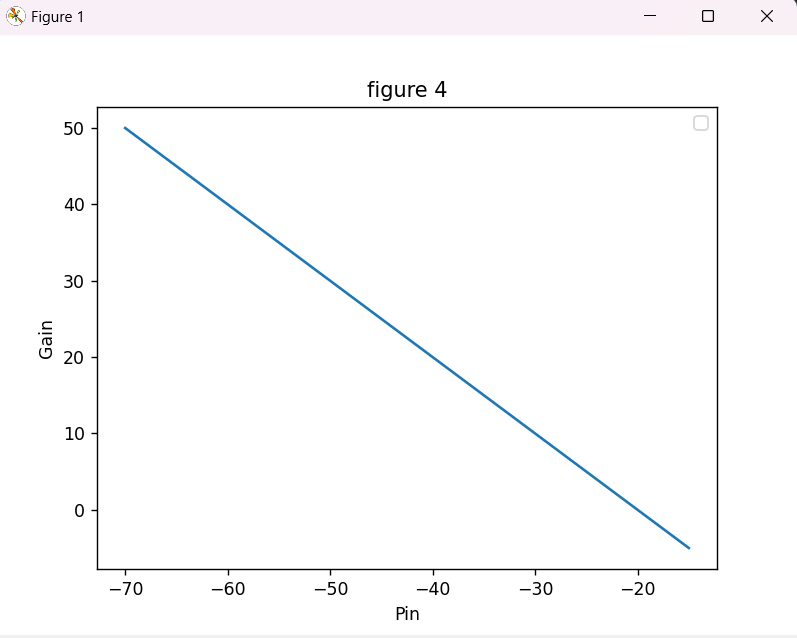


, , & , required is achieved

value:



* **Plot the gain versus Pin that achieves the above results**



The gain policies used is from when increases by the gain decrease to have a in this range of -20 dBm.

**The code used to plot the graphs was done by a python code.**

**The link:**

<https://drive.google.com/file/d/13V8WIza1XixoOcS24BomWlRg7ZyLNQVP/view?usp=sharing>